



During or after a treatment plant tour: Student Guide

Listed below are the steps for cleaning water at King County' South and West Point Treatment Plants. Next to each process step:

- Describe the process
- List the basic science used (physics, biology, chemistry)
- Describe the purpose of the process (what is removed).

Pre-Treatment bar screens:

- Description:

- Science
- Purpose:

Pre-Treatment Pre-aeration – grit removal:

- Description:

- Science
- Purpose:

Primary Treatment

- Description:

- Science
- Purpose:

Secondary Treatment- aeration basins

- Description:

- Science
- Purpose:

Secondary Treatment – clarifier tanks

- Description:



King County

Department of
Natural Resources and Parks
**Wastewater Treatment
Division**

**Wastewater Education Programs
Treatment Plant Tour-
Treatment Processes and Operations**

- Science
- Purpose:

Disinfection:

- Description:

- Science
- Purpose:

Tertiary Treatment -

- Description:

- Science
- Purpose:

Solid Treatment – Digesters

- Description:

- Science
- Purpose:

Solids Treatment – Dewatering (Gravity Belt Thickeners and Centrifuges)

- Description:

- Science
- Purpose:

List 5 different types of jobs required to make a treatment plant and sewer system operate effectively:



During or after a treatment plant tour: Teacher Guide

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Pre-Treatment bar screens:

- Description:
Larger, vertical steel screens remove trash (toilet paper) from raw sewage.
- Science: Physics
- Purpose: Trash removal

Pre-Treatment Pre-aeration – grit removal:

- Description:
A large tank with air added- air and turbulence allows heavy particles to settle to the bottom. Think of a 'hot tub' bubbles and turbulence and dirt settles to the bottom.
- Science: Physics
- Purpose: Dirt, sand, gravel removal

Primary Treatment

- Description:
Physical settling tank- organic material settles (sludge) or floats (scum), grease floats – poo and food settle --- think of the Italian salad dressing bottle in your refrigerator
- Science: Physics
- Purpose: 50% organic solids removal

Secondary Treatment- aeration basins

- Description:
Aerobic bacteria are activated with oxygen. When activated they reproduce and breakdown organic pollutants. Think of pac-man – when given oxygen the bugs wake, up, reproduce and 'eat' organics. Pac-man has a hard time 'eating' ghosts- the ghosts at



the treatment plant are the chemicals from cleaners, personal products and medicines.

- Science: Biology
- Purpose: Breakdown an additional 35-45% of organic solids

Secondary Treatment – clarifier tanks

- Description:
Settle out bacteria that have broken down organic solids. Without an oxygen supply bacteria de-activate and settle to the top or bottom of a physical settling tank, leaving behind water that has between 85% and 98% of the organics removed. Bacteria recycled back into the secondary aeration tanks.
- Science: Physics
- Purpose: Organics/bacteria removal

Disinfection:

- Description:
Chlorine or sodium hypochlorite is used to disinfect the treated water killing off remaining bacteria
- Science: Chemistry
- Purpose: Kill/deactivate bacteria

Tertiary Treatment -

- Description:
Additional filtration (sand) and disinfection to produce Class A reclaimed water for reuse.
- Science: Physics, chemistry
- Purpose: Additional removal of organic solids, bacteria. Produce water at least 99.9% clean.

Solid Treatment – Digesters

- Description:
Anaerobic bacteria breakdown organic solids removed from the water treatment for 1 month, producing nutrient rich solids and methane gas. Think of the digester tank as similar to a stomach or



compost bin. Methane gas is produced in the digester similar to gas produced in human digestive system.

- Science: Biology
- Purpose: Organic breakdown and bacterial management of organic waste.

Solids Treatment – Dewatering (Gravity Belt Thickeners, Dissolved Air Flotation Thickener and Centrifuges)

- Description:
‘Dry” out the solids – reduce the volume to make it easier* to treat in the digesters or easier* for truck transport to farms and forests
- Science: Gravity
- Purpose: remove water, make the solids easier to treat and transport

*Easier = cheaper, more efficient, less volume and weight making it more practical for treatment and transport

List 5 different types of jobs required to build, operate and maintain and treatment plant and sewer system:

- Operator
- Mechanic
- Electrician
- Manager
- Analyst
- Lab scientist (biologist, chemist)
- Office administrator (phones, filing, bill paying, employee payroll, schedules)
- Engineer
- Planner
- Architect
- Contractor- construction
- Truck driver
- Accountant
- Inspector – pipelines and facilities
- Communications staff- media, communities, schools
- Water quality tester
- Flow monitoring, mapping, GIS staff